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EXAMINER

SHARON, AYAL I

ART UNIT	PAPER NUMBER
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2123

DATE MAILED: 02/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/386,270

Applicant(s)

LOVELAND, JAMES B.

Examiner

Ayal I Sharon

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-- The MAILING DATE of this communication appears in the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Introduction

1. Claims 1-23 of U.S. Application 09/386,270 are presented for examination.
Applicant's Request for Consideration (paper #13) was filed in response to the Office Action (paper #12) rejecting the amended claims filed with an RCE (papers #10 and #11) on 05/27/03. The application was originally filed on 08/31/1999, and is a continuation of Application 08/991,148 with a filing priority date of 12/16/1997.
2. This action contains rejections based on new art, and therefore is non-final.

Claim Interpretations

3. Examiner interprets "morphing" (See specification: p.13, lines 8-12) as being equivalent to "changing" and "altering".

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 15-20 are rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility. The preamble to Claim 15 refers to "A computer-readable medium having computer executable instructions ...". A

computer-readable medium with instructions on it is not an operative invention. In order for the claim to be operative, the preamble must refer to instructions that perform a set of steps when executed, or similar.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The prior art used for these rejections is as follows:
8. Hsu et al. "A Constraint-Based Manipulator Toolset for Editing 3D Objects". Proc. of the 4th ACM Symposium on Solid Modeling and Applications. May 1997. pp.168-180. (Henceforth referred to as "**Hsu**").
9. Maxley, R. and E. Olson, New Riders' Reference Guide to AutoCAD Release 13. 1995. pp.21-39, 63-66, 267, 284-285, 293-295, 304-305, 307-310, 377-380, 402-404, 490-492, 560-562, 642-644. (Henceforth referred to as "**Maxley**").
10. Gromat, J., U.S. Patent 5,950,374. (Henceforth referred to as "**Gromat**").
11. **Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu in view of Maxley and further in view of Gromat.**
12. In regards to Claim 1, Hsu teaches the following limitations:

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1. (currently amended) A method for modeling at least one chamber of a building structure and for enabling estimation of various projects to be completed within said building structure, said method comprising the steps of:

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(a) selecting, from an estimation program, a non-derivational default volumetric polyhedron as an estimation polyhedron, said estimation polyhedron comprising a plurality of facets

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(b) assigning each of said facets at least one pre-defined estimation attribute that corresponds to a structural attribute of said chamber

(Hsu, especially: Fig.5, "4.1 Graph representation of constraints")

(c) morphing a selected facet of said plurality of facets to obtain a morphed facet such that said estimation polyhedron more closely approximates said chamber undergoing estimation;

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

Hsu also expressly teaches (p.173, right column) the following:

"Figures 10-12 show what happens when a face in the rectangular slot is rotated about one or two axes. The faces are automatically re-intersected to determine the new vertex locations."

It is inherent that new vertex locations may also result in new facet surface areas and new polyhedron volumes, especially after features are re-oriented and re-scaled, as shown in Figs.10-12 of Hsu, or after a picked vertex has been dragged to a new location, as shown in Fig.4 of Hsu.

However, Hsu does not expressly teach the following limitations:

(d) revising said at least one estimation attribute of said morphed facet and any adjacent facets of said estimation polyhedron also modified and affected by said step of morphing, in order to maintain a closed volume of said estimation polyhedron;

(e) repeating said step of morphing and said step of revising until said estimation polyhedron accurately depicts said chamber undergoing estimation; and

Maxley, on the other hand, teaches calculating the area, mass, and volume of

CAD objects. Maxley teaches that "MASSPROP is an inquiry command that

reports the physical properties of selected ACIS SOLIDs and REGIONS." The information provided includes mass and volume. (see especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command). Recalculation of mass and volume after changes in the vertex locations is inherent.

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

Hsu also does not expressly teach the following limitation:

(f) generating a project estimate by selecting at least one facet of said estimation polyhedron and entering an estimation request into a query in said estimation program, said project estimate is based upon and associated with said estimation attributes of said estimation polyhedron and corresponds to a project to be completed in said building structure.

Gromat, on the other hand, does expressly teach calculating material requirements and costs. Gromat teaches the following (see col.6, line 63 to col.7, line 10):

Preferably the grid layout is generated as a computer image and the layouts are formed on screen for the respective functions, such as room layout, matching roof layout and doors and windows, for example, with or by a customer if desired. Using simple CAD techniques, the computer can be programmed to automatically generate a three dimensional drawing of the structure and can unload details of the respective panel frame sections to suit, to workshop metal working apparatus for cost effective and accurate prefabrication of all structural frame assemblies. Furthermore, Substantially instantaneous calculations may be automatically

computed of the weight of steel, the number of joining members and cost of supply thereof. A typical organizational marketing manufacturing and supply structure is illustrated in the flow chart of FIG. 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Hsu with those of Gromat, because doing so would be "cost effective" and "accurate" (see Gromat, col.6, line 63 to col.7, line 10).

13. In regards to Claim 2, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

2. The method as recited in claim 1, wherein:

(a) said morphing step further comprises the step of when additional facets better approximate said chamber undergoing approximation, partitioning said selected facet of said estimation polyhedron into at least a first and second morphed facets to provide an improved estimation of said chamber undergoing estimation; and

(Maxley, especially: p.39 "3DMesh" command; pp.560-562 "Revsurf" command; pp.293-295 "Edgesurf" command; pp.304-305 "Explode" command; pp.490-492 "Pface" command)

(b) said revising step further comprises the step of from said at least first and second morphed facets of said selected facet, including additional estimation attributes corresponding to said first and second morphed facets.

(Maxley, especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide

to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

14. In regards to Claim 3, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

3. The method as recited in claim 1, further comprising the step of:

(a) defining said chamber as a room within a building; and

(Maxley, especially: pp.284-285, Figs. D.80 and D.81)

(b) defining said attributes to include a surface area correlating to said plurality of facets of said estimation polyhedron.

(Maxley, especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

15. In regards to Claim 4, Hsu does not expressly teach the following limitations,

however, Maxley does teach them:

4. The method as recited in claim 3, wherein said defining said chamber attribute step further comprises the steps of:

(a) assigning one of said plurality of facets of said estimation polyhedron a floor attribute of said room;

(Maxley, especially: pp.63-66 "Area" command)

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(b) assigning each of others of said plurality of facets of said estimation polyhedron adjacent to said facet having said floor attribute a wall attribute;
(Maxley, especially: pp.63-66 "Area" command)

(c) assigning one of said plurality of facets of said estimation polyhedron adjacent to said ones of said plurality of facets having said wall attribute a ceiling attribute.
(Maxley, especially: pp.63-66 "Area" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

16. In regards to Claim 5, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

5. The method as recited in claim 1, wherein said selecting a default polyhedron further comprises the step of:

- (a) defining said default polyhedron to include:
- i. at least 4 facets each defined by a plurality of vertices shared by others of said at least 4 facets;
 - ii. a surface area for each of said at least 4 facets; and
 - iii. a volume of said default polyhedron as bounded by each of said at least 4 facets.

(Maxley, especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are

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directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

17. In regards to Claim 6, Hsu teaches the following limitations:

6. (currently amended) A method for graphically estimating attributes of a room of a building structure, said method comprising the steps of:

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(a) selecting a default volumetric polyhedron as an estimation polyhedron to approximate said attributes of said room, said estimation polyhedron comprising a plurality of facets;

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(b) assigning each of said facets at least one pre-defined estimation attribute that corresponds to a structural attribute of said room;

(Hsu, especially: Fig.5, "4.1 Graph representation of constraints")

(c) morphing at least one of said plurality of facets of said estimation polyhedron to obtain a morphed facet and to more closely approximate said room undergoing estimation;

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

Hsu also expressly teaches (p.173, right column) the following:

"Figures 10-12 show what happens when a face in the rectangular slot is rotated about one or two axes. The faces are automatically re-intersected to determine the new vertex locations."

It is inherent that new vertex locations may also result in new facet surface areas and new polyhedron volumes, especially after features are re-oriented and

re-scaled, as shown in Figs.10-12 of Hsu, or after a picked vertex has been dragged to a new location, as shown in Fig.4 of Hsu.

However, Hsu does not expressly teach the following limitations:

(d) revising said at least one estimation attribute of said morphed facet and any adjacent facets of said estimation polyhedron also modified and affected by said step of morphing, in order to maintain a closed volume of said estimation polyhedron;

(e) repeating said morphing and revising steps until said estimation polyhedron accurately depicts said room undergoing estimation;

(f) listing said estimation attributes of said estimation polyhedron as said attributes of said room; and

Maxley, on the other hand, teaches calculating and listing the area, mass, and volume of CAD objects. Maxley teaches that "MASSPROP is an inquiry command that reports the physical properties of selected ACIS SOLIDS and REGIONS." The information provided includes mass and volume. (see especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command). Recalculation of mass and volume after changes in the vertex locations is inherent.

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

Hsu also does not expressly teach the following limitation:

(g) generating a project estimate by selecting an estimation attribute from said list and entering an estimate request into a query in said estimation program, said project estimate is based upon and associated with said selected estimation attribute and corresponds to a project to be completed in said building structure.

Gromat, on the other hand, does expressly teach calculating material

requirements and costs. Gromat teaches the following (see col.6, line 63 to col.7, line 10):

Preferably the grid layout is generated as a computer image and the layouts are formed on screen for the respective functions, such as room layout, matching roof layout and doors and windows, for example, with or by a customer if desired. Using simple CAD techniques, the computer can be programmed to automatically generate a three dimensional drawing of the structure and can unload details of the respective panel frame sections to suit, to workshop metal working apparatus for cost effective and accurate prefabrication of all structural frame assemblies. Furthermore, Substantially instantaneous calculations may be automatically computed of the weight of steel, the number of joining members and cost of supply thereof. A typical organizational marketing manufacturing and supply structure is illustrated in the flow chart of FIG. 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Hsu with those of Gromat, because doing so would be "cost effective" and "accurate" (see Gromat, col.6, line 63 to col.7, line 10).

18. In regards to Claim 7, Hsu does not expressly teach the following limitations,

however, Maxley does teach them:

7. The method as recited in claim 6, wherein said selecting step further comprises the steps of:

(a) assigning one of said plurality of facets of said estimation polyhedron a floor attribute of said room;

(Maxley, especially: pp.63-66 "Area" command)

(b) assigning each of others of said plurality of facets of said estimation polyhedron adjacent to said facet having said floor attribute a wall attribute; and

(Maxley, especially: pp.63-66 "Area" command)

(c) assigning one of said plurality of facets of said estimation polyhedron adjacent to said ones of said plurality of facets having said wall attribute a ceiling attribute.

(Maxley, especially: pp.63-66 "Area" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

19. In regards to Claim 8, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

8. The method as recited in claim 6, wherein:

(a) said morphing step further comprises the step of when additional facets better approximate said chamber undergoing approximation, partitioning said selected facet of said estimation polyhedron into at least a first and second morphed facets to provide an improved estimation of said chamber undergoing estimation; and

(Maxley, especially: p.39 "3DMesh" command; pp.560-562 "Revsurf" command; pp.293-295 "Edgesurf" command; pp.304-305 "Explode" command; pp.490-492 "Pface" command)

(b) said revising step further comprises the step of from said at least first and second morphed facets of said selected facet, including additional estimation attributes corresponding to said first and second morphed facets.

(Maxley, especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu

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teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

20. In regards to Claim 9, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

9. The method as recited in claim 6, further comprising the steps of hierarchically grouping additional rooms into levels and grouping a plurality of levels into a structure.
(Maxley, especially: pp.34-37 "3Darray" command; p.39 "3DMesh" command;)

21. In regards to Claim 10, Hsu teaches the following limitations:

10. (currently amended) A graphical method for estimating material requirements for a room within a structure, wherein said room is comprised of a plurality of planes, comprising:
(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(a) displaying a default surface polygon, said surface polygon forming one plane of a plurality of planes of a volumetric estimation polyhedron for approximating said room, said plurality of planes each further having an estimation attribute assigned thereto that corresponds to a structural attribute of said room;

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations"; Fig.5, "4.1 Graph representation of constraints")

(b) morphing said default surface polygon into a morphed polygon to approximate a plane of said room undergoing estimation;

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

Hsu also expressly teaches (p.173, right column) the following:

"Figures 10-12 show what happens when a face in the rectangular slot is rotated about one or two axes. The faces are automatically re-intersected to determine the new vertex locations."

It is inherent that new vertex locations may also result in new facet surface areas and new polyhedron volumes, especially after features are re-oriented and re-scaled, as shown in Figs.10-12 of Hsu, or after a picked vertex has been dragged to a new location, as shown in Fig.4 of Hsu.

However, Hsu does not expressly teach the following limitations:

(c) revising said estimation attribute of said morphed polygon and adjacent ones of said plurality of planes affected by said morphing step in order to maintain a closed volume of said estimation polyhedron;

(d) repeating said morphing and revising steps until said estimation polyhedron accurately approximates said room undergoing estimation;

Maxley, on the other hand, teaches calculating the area, mass, and volume of CAD objects. Maxley teaches that "MASSPROP is an inquiry command that reports the physical properties of selected ACIS SOLIDs and REGIONS." The information provided includes mass and volume. (see especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command). Recalculation of mass and volume after changes in the vertex locations is inherent.

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide

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to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

Hsu also does not expressly teach the following limitation:

(e) converting said estimation attributes of said estimation polyhedron into said material requirements for said room within said structure by selecting at least one plane of said estimation polyhedron and entering a materials request into a query in said estimation program.

Gromat, on the other hand, does expressly teach calculating material requirements and costs. Gromat teaches the following (see col.6, line 63 to col.7, line 10):

Preferably the grid layout is generated as a computer image and the layouts are formed on screen for the respective functions, such as room layout, matching roof layout and doors and windows, for example, with or by a customer if desired. Using simple CAD techniques, the computer can be programmed to automatically generate a three dimensional drawing of the structure and can unload details of the respective panel frame sections to suit, to workshop metal working apparatus for cost effective and accurate prefabrication of all structural frame assemblies. Furthermore, Substantially instantaneous calculations may be automatically computed of the weight of steel, the number of joining members and cost of supply thereof. A typical organizational marketing manufacturing and supply structure is illustrated in the flow chart of FIG. 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Hsu with those of Gromat, because doing so would be "cost effective" and "accurate" (see Gromat, col.6, line 63 to col.7, line 10).

22. In regards to Claim 11, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

11. The method as recited in claim 10, wherein:

(a) said morphing step further comprises the step of when additional planes better approximate said room undergoing estimation, partitioning said morphed polygon of said estimation polyhedron into at least a first and second morphed polygons to provide an improved estimation of said room undergoing estimation; and

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(Maxley, especially: p.39 "3Dmesh" command; pp.560-562 "Revsurf" command; pp.293-295 "Edgesurf" command; pp.304-305 "Explode" command; pp.490-492 "Pface" command)

(b) said revising step further comprises the step of from said at least first and second morphed polygons of said selected facet, including additional estimation attributes corresponding to said first and second morphed polygons.

(Maxley, especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

23. In regards to Claim 12, Hsu does not expressly teach the following limitation:

12. The method as recited in claim 11, wherein said converting said estimation attributes of said estimation polyhedron step comprises the step of:

(a) converting said estimation attribute into a quantity of a specific one of said material requirements.

Gromat, on the other hand, does expressly calculating material requirements and costs. Gromat teaches the following (see col.6, line 63 to col.7, line 10):

Preferably the grid layout is generated as a computer image and the layouts are formed on screen for the respective functions, such as room layout, matching roof layout and doors and windows, for example, with or by a customer if desired. Using simple CAD techniques, the computer can be programmed to automatically generate a three dimensional drawing of the structure and can unload details of the respective panel frame sections to suit, to workshop metal working apparatus for cost effective and accurate prefabrication of all structural frame assemblies. Furthermore, Substantially instantaneous calculations may be automatically computed of the weight of steel, the number of joining members and cost of supply thereof. A

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typical organizational marketing manufacturing and supply structure is illustrated in the flow chart of FIG. 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Hsu with those of Gromat, because doing so would be "cost effective" and "accurate" (see Gromat, col.6, line 63 to col.7, line 10).

24. In regards to Claim 13, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

13. The method as recited in claim 11, further comprising the steps of:

(a) redefining another one of said plurality of planes of said estimation polyhedron as said default surface polygon to display, morph and revise estimation attributes associated therewith. (Maxley, especially: pp.63-66 "Area" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

25. In regards to Claim 14, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

14. The method as recited in claim 10, wherein said displaying step further comprises the steps of:

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(a) assigning one of said plurality of planes of said estimation polyhedron a floor attribute of said room;

(Maxley, especially: pp.63-66 "Area" command)

(b) assigning each of others of said plurality of planes of said estimation polyhedron adjacent to said plane having said floor attribute a wall attribute; and

(Maxley, especially: pp.63-66 "Area" command)

(c) assigning one of said plurality of planes of said estimation polyhedron adjacent to said ones of said plurality of planes having said wall attribute a ceiling attribute.

(Maxley, especially: pp.63-66 "Area" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

26. In regards to Claim 15, Hsu teaches the following limitations:

15. (currently amended) A computer-readable medium having computer-executable instructions for performing the steps comprising:

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(a) displaying a default surface polygon, said surface polygon forming one plane of a plurality of planes of a volumetric estimation polyhedron for approximating room of a building structure

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(b) assigning each of said planes at least one pre-defined estimation attribute that corresponds to a structural attribute of said room;

(Hsu, especially: Fig.5, "4.1 Graph representation of constraints")

(c) morphing said default surface polygon into a morphed polygon such that said morphed polyhedron more closely approximates a plane of said room undergoing estimation; (Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

Hsu also expressly teaches (p.173, right column) the following:

"Figures 10-12 show what happens when a face in the rectangular slot is rotated about one or two axes. The faces are automatically re-intersected to determine the new vertex locations."

It is inherent that new vertex locations may also result in new facet surface areas and new polyhedron volumes, especially after features are re-oriented and re-scaled, as shown in Figs.10-12 of Hsu, or after a picked vertex has been dragged to a new location, as shown in Fig.4 of Hsu.

However, Hsu does not expressly teach the following limitations:

(d) revising said estimation attribute of said morphed polygon and any adjacent planes modified and affected by said morphing step, in order to maintain a closed volume of said estimation polyhedron;

(e) repeating said morphing and revising steps until said estimation polyhedron accurately approximates said room of said building structure undergoing estimation; and

Maxley, on the other hand, teaches calculating the area, mass, and volume of CAD objects. Maxley teaches that "MASSPROP is an inquiry command that reports the physical properties of selected ACIS SOLIDs and REGIONS." The information provided includes mass and volume. (see especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command). Recalculation of mass and volume after changes in the vertex locations is inherent.

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu

teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

Hsu also does not expressly teach the following limitation:

(f) generating a project estimate by selecting at least one plane of said estimation polyhedron and entering an estimation request into a query in said estimation program, said project estimate is based upon and associated with said estimation attributes of said estimation polyhedron and corresponds to a project to be completed in said building structure.

Gromat, on the other hand, does expressly teach calculating material requirements and costs. Gromat teaches the following (see col.6, line 63 to col.7, line 10):

Preferably the grid layout is generated as a computer image and the layouts are formed on screen for the respective functions, such as room layout, matching roof layout and doors and windows, for example, with or by a customer if desired. Using simple CAD techniques, the computer can be programmed to automatically generate a three dimensional drawing of the structure and can unload details of the respective panel frame sections to suit, to workshop metal working apparatus for cost effective and accurate prefabrication of all structural frame assemblies. Furthermore, Substantially instantaneous calculations may be automatically computed of the weight of steel, the number of joining members and cost of supply thereof. A typical organizational marketing manufacturing and supply structure is illustrated in the flow chart of FIG. 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Hsu with those of Gromat, because doing so would be "cost effective" and "accurate" (see Gromat, col.6, line 63 to col.7, line 10).

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27. In regards to Claim 16, Hsu does not expressly teach the following limitations,

however, Maxley does teach them:

16. The computer-readable medium of claim 15 having further Computer executable instructions for performing the steps of:

(a) said morphing step further comprises the step of when additional planes better approximate said room undergoing estimation, partitioning said morphed polygon of said estimation polyhedron into at least a first and second morphed polygons to provide an improved estimation of said room undergoing estimation; and

(Maxley, especially: p.39 "3DMesh" command; pp.560-562 "Revsurf" command; pp.293-295 "Edgesurf" command; pp.304-305 "Explode" command; pp.490-492 "Pface" command)

(b) said revising step further comprises the step of from said at least first and second morphed polygons of said selected facet, including additional estimation attributes corresponding to said first and second morphed polygons.

(Maxley, especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

28. In regards to Claim 17, Hsu does not teach the following limitations:

17. The computer-readable medium of claim 15, wherein said computer executable instructions for performing the step of converting said estimation attributes of said estimation polyhedron step further comprises computer-executable instructions for performing the step of:

(a) converting said estimation attribute into a quantity of a specific one of

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said material requirements.

Gromat, on the other hand, does expressly calculating material requirements and costs. Gromat teaches the following (see col.6, line 63 to col.7, line 10):

Preferably the grid layout is generated as a computer image and the layouts are formed on screen for the respective functions, such as room layout, matching roof layout and doors and windows, for example, with or by a customer if desired. Using simple CAD techniques, the computer can be programmed to automatically generate a three dimensional drawing of the structure and can unload details of the respective panel frame sections to suit, to workshop metal working apparatus for cost effective and accurate prefabrication of all structural frame assemblies. Furthermore, Substantially instantaneous calculations may be automatically computed -of the weight of steel, the number of joining members and cost of supply thereof. A typical organizational marketing manufacturing and supply structure is illustrated in the flow chart of FIG. 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Hsu with those of Gromat, because doing so would be "cost effective" and "accurate" (see Gromat, col.6, line 63 to col.7, line 10).

29. In regards to Claim 18, Hsu does not expressly teach the following limitations, however, Maxley does teach them:

18. The computer-readable medium of claim 15, having further computer executable instructions for performing the steps of:

(a) redefining another one of said plurality of planes of said estimation polyhedron as said default surface polygon to display, morph and revise estimation attributes associated therewith. (Maxley, especially: pp.63-66 "Area" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they

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provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

30. In regards to Claim 19, Hsu does not expressly teach the following limitations,

however, Maxley does teach them:

19. The computer-readable medium of claim 15, wherein said computer executable instructions for performing the Step of displaying a default surface polygon further comprises computer-executable instructions for performing the step of:

(a) assigning one of said plurality of planes of said estimation polyhedron a floor attribute of said room;

(Maxley, especially: pp.63-66 "Area" command)

(b) assigning each of others of said plurality of planes of said estimation polyhedron adjacent to said plane having said floor attribute a wall attribute; and

(Maxley, especially: pp.63-66 "Area" command)

(c) assigning one of said plurality of planes of said estimation polyhedron adjacent to said ones of said plurality of planes having said wall attribute a ceiling attribute.

(Maxley, especially: pp.63-66 "Area" Command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

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31. In regards to Claim 20, Hsu does not expressly teach the following limitations,

however, Maxley does teach them:

20. The computer-readable medium of claim 15, having further computer executable instructions for performing the step of hierarchically grouping additional rooms into levels and grouping a plurality of levels into a structure.

(Maxley, especially: pp.34-37 "3Darray" command; p.39 "3Dmesh" command;)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

32. In regards to Claim 21, Hsu teaches the following limitations:

21. (currently amended) A method for computerized modeling of at least one chamber of a building structure and for enabling estimation of various chamber projects, said method comprising the steps of:

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(a) selecting, from an estimation program, a default polyhedron as a volumetric estimation polyhedron, said estimation polyhedron comprising a plurality of vertices and facets

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

(b) assigning each of said facets at least one pre-determined estimation attribute corresponding to a structural attribute of said chamber;

(Hsu, especially: Fig.5, "4.1 Graph representation of constraints")

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(c) dragging at least one of said plurality of vertices to alter at least one of said characteristics of said facet of said estimation polyhedron to obtain an altered facet that more closely approximates said chamber undergoing estimation;

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

Hsu also expressly teaches (p.173, right column) the following:

"Figures 10-12 show what happens when a face in the rectangular slot is rotated about one or two axes. The faces are automatically re-intersected to determine the new vertex locations."

It is inherent that new vertex locations may also result in new facet surface areas and new polyhedron volumes, especially after features are re-oriented and re-scaled, as shown in Figs.10-12 of Hsu, or after a picked vertex has been dragged to a new location, as shown in Fig.4 of Hsu.

However, Hsu does not expressly teach the following limitations:

(d) recalculating said at least one estimation attribute of said altered facet and any adjacent facets of said estimation polyhedron also modified and affected by said altering step in order to maintain a closed volume of said estimation polyhedron;

(e) repeating said altering and recalculating steps until said estimation polyhedron accurately depicts said chamber such that said calculated estimation attribute accurately estimates said chamber;

Maxley, on the other hand, teaches calculating the area, mass, and volume of CAD objects. Maxley teaches that "MASSPROP is an inquiry command that reports the physical properties of selected ACIS SOLIDs and REGIONS." The information provided includes mass and volume. (see especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command). Recalculation of mass and volume after changes in the vertex locations is inherent.

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are

directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

Hsu also does not expressly teach the following limitation:

(f) generating a project estimate by selecting at least one facet of said estimation polyhedron and entering an estimation request into a query in said estimation program, said project estimate is based upon and associated with said estimation attributes of said estimation polyhedron and corresponds to a project to be completed in said building structure.

Gromat, on the other hand, does expressly teach calculating material requirements and costs. Gromat teaches the following (see col.6, line 63 to col.7, line 10):

Preferably the grid layout is generated as a computer image and the layouts are formed on screen for the respective functions, such as room layout, matching roof layout and doors and windows, for example, with or by a customer if desired. Using simple CAD techniques, the computer can be programmed to automatically generate a three dimensional drawing of the structure and can unload details of the respective panel frame sections to suit, to workshop metal working apparatus for cost effective and accurate prefabrication of all structural frame assemblies. Furthermore, Substantially instantaneous calculations may be automatically computed of the weight of steel, the number of joining members and cost of supply thereof. A typical organizational marketing manufacturing and supply structure is illustrated in the flow chart of FIG. 18.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Hsu with those of Gromat, because doing so would be "cost effective" and "accurate" (see Gromat, col.6, line 63 to col.7, line 10).

33. In regards to Claim 22, Hsu does not expressly teach the following limitations,

however, Maxley does teach them:

22. The method as recited in claim 21, wherein:

said altering step further comprises the step of when additional facets better approximated said chamber undergoing approximation, partitioning said

selected facet of said estimation polyhedron into at least a first and a second altered facet to provide an improved estimation of said chamber undergoing estimation.; and

(Maxley, especially: p.39 "3DMesh" command; pp.560-562 "Revsurf" command; pp.293-295 "Edgesurf" command; pp.304-305 "Explode" command; pp.490-492 "Pface" command)

said recalculating step further comprising the step of including additional estimation attributes corresponding to said first and second altered facets.

(Maxley, especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command)

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

34. In regards to Claim 23, Hsu teaches the following limitations:

23. (new) The method of claim 1, further comprising the steps of:

(a) obtaining additional volumetric polyhedrons, each of which are utilized as estimation polyhedrons, said additional volumetric polyhedrons also comprising a plurality of facets; and (Hsu, especially: Fig. 15-21, "5 Snap-Dragging and Constraints")

(b) combining said additional volumetric polyhedrons with said default volumetric polyhedron to obtain a plurality of volumetric polyhedrons for modeling hierarchical structures comprised of multiple chambers;

(Hsu, especially: Fig. 15-21, "5 Snap-Dragging and Constraints")

(c) assigning each of said facets in said plurality of volumetric polyhedrons at least one estimation attribute corresponding to an attribute of one of said chambers in said hierarchal structure;

(Hsu, especially: Fig.5, "4.1 Graph representation of constraints")

(c) morphing at least one selected facet of said plurality of volumetric polyhedrons to more closely approximate said chambers of said hierarchal structure and

(Hsu, especially: Figs.3-4 and "4. Geometric Constraints"; Figs.8-12 and "4.2 Evaluating the Constraint Definitions in Interactive Situations")

However, Hsu does not expressly teach the following limitation:

(d) revising said estimation attributes of all relevant facets in response to said step of morphing.

Maxley, on the other hand, teaches calculating the area, mass, and volume of CAD objects. Maxley teaches that "MASSPROP is an inquiry command that reports the physical properties of selected ACIS SOLIDs and REGIONS." The information provided includes mass and volume. (see especially: pp.63-66 "Area" command and pp.402-404 "Massprop" command). Recalculation of mass and volume after changes in the vertex locations is inherent.

It would have been obvious to one of ordinary skill in the art to modify the teachings of Hsu with those of Maxley, because both Hsu and Maxley of art are directed to the field of CAD with feature sets that complement one another. Hsu teaches that "We present TWEAK, a new constraint-based manipulator tool set for editing CAD models ... The multiple functionality of the manipulators makes modifications of CAD models easy and intuitive, and at the same time, they provide the necessary accuracy." (p.168, Abstract). Maxley is a reference guide

to AutoCAD 13, a well known CAD program with many features not disclosed in Hsu.

Response to Arguments

35. In regards to the process of "morphing", Applicants persuasively argue (paper #13, pp.3-4) that the "Extend", "Lengthen", and "Stretch" commands in Maxley do not apply to volumetric shapes such as blocks or shapes. Examiner has found Applicant's arguments to be persuasive.

Hsu, on the other hand, does teach these "morphing" features as defined by the Applicant, especially at Figs.3-4 and their associated text ("4. Geometric Constraints"), as well as at Figs.8-12 and their associated text ("4.2 Evaluating the Constraint Definitions in Interactive Situations"). The rejections based on Maxley have been replaced with rejections based on Hsu.

36. In regards to the process of "revising", Applicants unpersuasively argue (paper #13, pp.4-5) that the "Area" and "Massprop" commands in Maxley do not teach or suggest revising or recalculating:

"Maxley's 'Area' and 'Massprop' commands do not mention the present invention's revising and recalculating limitations; instead they only mention the functions of calculating an area and reporting physical properties.

This step of revising or recalculating is important to accurate and efficient estimation because morphed facets often change the attributes of adjacent facets. Accordingly, the revising and recalculating process of the present invention is neither taught nor suggested in Maxley."

Examiner wishes to point out that Hsu expressly teaches (p.173, right column) the following:

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"Figures 10-12 show what happens when a face in the rectangular slot is rotated about one or two axes. The faces are automatically re-intersected to determine the new vertex locations."

It is inherent that new vertex locations may also result in new facet surface areas and new polyhedron volumes, especially after features are re-oriented and re-scaled, as shown in Figs.10-12 of Hsu.

Hsu's teachings of new vertex locations does not expressly teach the need to recalculate area and volume, however, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a step of recalculating the area and volume after vertex locations have been relocated.

37. In regards to the process of "partitioning", Applicants unpersuasively argue (paper #13, pp.5-6) that none of Maxley's "3Dmesh", "Edgesurf", "Revsurf", "Explode", and "Pface" commands teach or suggest "partitioning a facet into at least a first and second morphed facet to provide an improved estimation of said chamber undergoing estimation".

In regards to the "3Dmesh" command (Maxley, p.39), Maxley teaches the following (please note that it also makes reference to the "Edgesurf", "Revsurf", and "Explode" commands):

"The 3DMESH command creates an MxN three-dimensional polygon mesh, defined by the locations of each of its verticies. The 3DMESH command forms a net-like surface, each face of which is defined by four verticies. You must specify the coordinates for the corners of the faces.

Begin by specifying the number of verticies in the two directions of the mesh, known as the M and N directions. Most of the other commands that create polygon meshes (EDGESURF and REVSURF, for example)

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determine the M and N mesh size from the values in the system variables SURFTAB1 and SURFTAB2. The 3DMESH command requires you to enter them.

After entering the number of vertices in the M and N directions, the 3DMESH command prompts you for the locations of all the vertices in order.

This command is best suited for use by third-party programs that automate the selection of coordinate points. For most purposes, you should use one of the other 3D surface commands. After the mesh is created, you can edit it with the PEDIT command. If the mesh is EXPLODED, it is replaced with individual 3D faces."

For more details about the "Edgesurf", "Revsurf", and "Explode" commands, see Maxley, pp.560-562 ("Revsurf" command), pp.293-295 ("Edgesurf" command), and pp.304-305 ("Explode" command).

In regards to the "Pface" command (Maxley, pp.490-491), Maxley teaches the following:

"The PFACE command creates a polygon mesh by first locating points in 3D space and then connecting these points to form a face. Virtually any number of points (called vertices) can be defined. Many different faces can be created from these vertices."

Examiner finds that the descriptions of these two commands, "3Dmesh" and "Pface" anticipate the claimed limitation of "partitioning a facet into at least a first and second morphed facet". While the description of these two commands in Maxley does not expressly teach doing so in order to "provide an improved estimation of said chamber undergoing estimation", this functionality is an inherent benefit that derives from the ability to create "many different faces" from vertices in a polygon mesh.

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Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (703) 306-0297. The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska can be reached on (703) 305-9704. Any response to this office action should be mailed to:

Director of Patents and Trademarks
Washington, DC 20231

Hand-delivered responses should be brought to the following office:

4th floor receptionist's office
Crystal Park 2
2121 Crystal Drive
Arlington, VA

The fax phone number for the organization where this application or proceeding is assigned is: (703) 872-9306

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist, whose telephone number is: (703) 305-3900.

Ayal I. Sharon

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January 29, 2004



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PATENT EXAMINER